Ocean Surveyor
Ocean Observer

Test Guide

RD Instruments

Acoustic Doppler Solutions

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Ocean Surveyor/Observer Test Guide

1 Introduction

This guide explains how to test the Ocean Surveyor/Observer. *BBTalk* thoroughly checks the Ocean Surveyor/Observer in a laboratory environment, but is no substitute for the Sea Acceptance Tests. You should do the Dock Side tests:

- When you first receive the Ocean Surveyor/Observer.
- Before and after each deployment or every six months.
- When you suspect instrument problems.

These test procedures assume all equipment is working. The tests can help you isolate problems to a major functional area of the ADCP. For troubleshooting information, see the Troubleshooting Guide.

> **CAUTION.** Do NOT ping the Ocean Surveyor with the transducer in air. The power assembly board will short, causing the electronics chassis to no longer communicate. The transducer is pinged by sending a CS or PT5 command or if *VmDas* is started for collecting data – either of these methods will cause damage if the transducer is in air.

2 Dock Side Tests

The following checks should occur at Dock Side prior to performing the Sea Acceptance Tests. These tests will verify the Ocean Surveyor/Observer ADCP is ready for the Sea Acceptance Tests and confirm the peripherals attached to the ADCP.

> **NOTE.** Compare future tests to the Dock Side test results. If large changes have occurred, check to see if changes have been made to the installation (i.e. a new sonar device installed, the Ocean Surveyor/Observer transducer cable or electronic chassis was moved). **Changes in the test results do not necessarily mean that the system is failing, but do require further investigation.** Perform the Sea Acceptance tests (see “Sea Acceptance Tests,” page 9) to fully evaluate the system performance.

2.1 Dock Side Diagnostic Tests

The Ocean Surveyor/Observer ADCP interfaces directly to the computer and to external gyros. The following tests will confirm the connection of the Ocean Surveyor/Observer Electronics Chassis to the Transducer.

Table 1: Dock Side Test Setup

Setup	Description
Platform/Vessel	The vessel should be tied to the dock or at anchor. The transducer should be in water. All other sonar devices and equipment should be turned off.
Ocean Surveyor/Observer	The Ocean Surveyor/Observer ADCP electronics chassis should be connected to the transducer, and AC Power connected to the electronics chassis. The Gyro connection may or may not be connected at this point.
Computer	The RDI *BBTalk* program should be running, communications port setting (F5) to match the connection to the PC and Ocean Surveyor/Observer ADCP baud rate requirements (default 9600,N,8,1).

Use the following steps to interconnect the Ocean Surveyor/Observer system and to place the ADCP in a known state.

a. Interconnect and apply power to the system as shown in Figure 1, page 3.

b. Start the *BBTalk* program.

c. Press **<F2>** and run the script file TestOS.rds. The results of the tests will be printed to the screen and saved to the log file OS_RSLTS.txt. The OS_RSLTS.txt file will be created in the same directory that *BBTalk* is running from. See "BBTalk Test Results," page 4 for information on the test results.

> **NOTE.** Print and save a copy of the OS_RSLTS.txt file. Use these test results as a "baseline" value for future comparison of the PT test values.

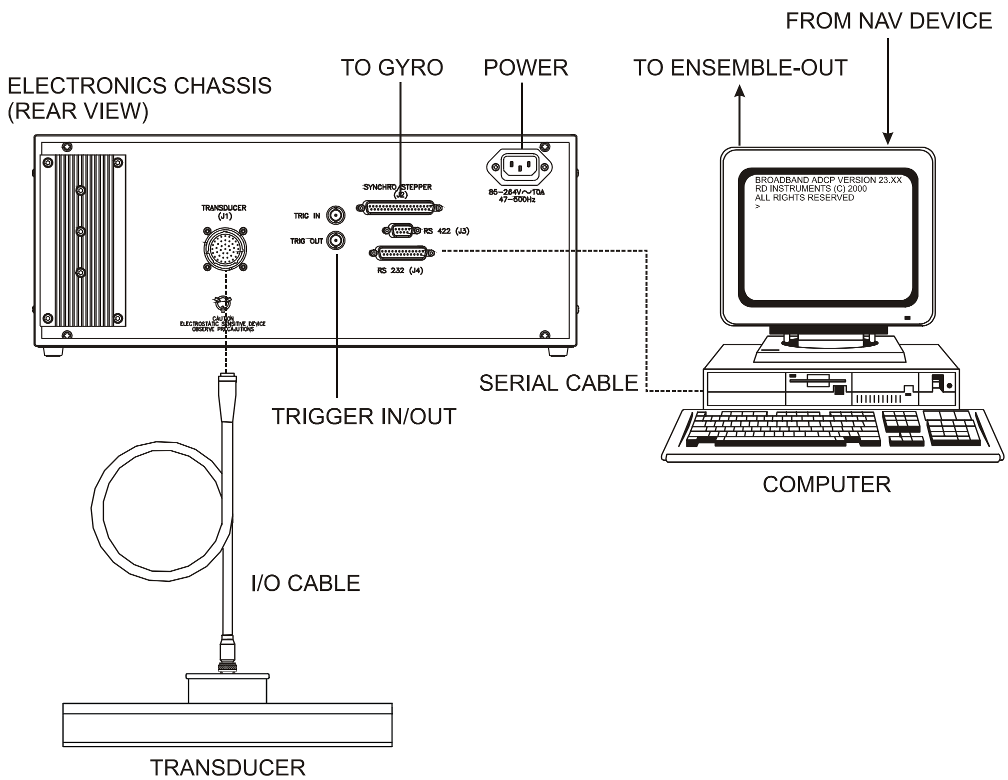

Figure 1. Ocean Surveyor/Observer Connections

2.2 BBTalk Test Results

This section shows an example of the OS_RSLTS.txt printout after running the *BBTalk* script file TestOS.rds.

> **NOTE.** The built-in tests require you to immerse the transducer faces in water. If you do not, some of the tests may fail.

> **CAUTION.** Do NOT ping the Ocean Surveyor with the transducer in air. The power amplifier board will short, causing the electronics chassis to no longer communicate. The transducer is pinged by sending a CS or PT5 command or if *VmDas* is started for collecting data – either of these methods will cause damage if the transducer is in air.

> **NOTE.** Do not place the electronic chassis within 3 feet of a computer monitor. Monitors are a major source of electronic interference.

2.2.1 Display System Parameters

This tells the ADCP to display specific information about your ADCP. For example:

```
>PS0
Frequency:  38400 HZ
   Configuration:  4 BEAM, JANUS
 Transducer Type:  PHASED ARRAY
      Beam Angle:  30 DEGREES
    Beam Pattern:  CONVEX
     Orientation:  DOWN
    CPU Firmware:  14.04
     Temp Sensor:  STANDARD
 Attitude Sensor:  NONE
```

Verify the information is consistent with what you know about the setup of your system. If PS0 does *not* list all your sensors, the system may not be configured properly, there is a problem with either the communications to the transducer assembly or a problem with the motherboard.

To check the system configuration using *BBTalk*, do the following.

a. If you have an Ocean Observer skip to step b. If you have an Ocean Surveyor and you are receiving an error message that the TCM2 compass is not detected, then do the following.

   1. Start *BBTalk* and press the **End** key to wake the system.
   2. Type @C – The ADCP will respond with a configuration list. You will want to ensure that both the TCM2 Detect is DISABLED and that the Platform is set to SHIP. If they are not set properly then follow steps 3 through 6 to set them properly.
   3. Type D to access the TCM2 configuration.

4. Type 0 to disable the TCM2 compass.
5. Type P to access the Platform configuration.
6. Type 0 for Ship configuration.
7. Type 1 to Save and Exit.
8. Press End to send a Break to the ADCP.
9. After the wake up message appears, check if the system has been configured properly.

b. If you have an Ocean Observer and the TCM2 compass is not detected, then do the following.

   1. Start *BBTalk* and press the **End** key to wake the system.
   2. Type @C – The ADCP will respond with a configuration list. You will want to ensure that both the TCM2 Detect is ENABLED and that the Platform is set to PLATFORM. If they are not set properly then follow steps 3 through 6 to set them properly.
   3. Type D to access the TCM2 configuration.
   4. Type 1 to enable the TCM2 compass.
   5. Type P to access the Platform configuration.
   6. Type 1 for Platform configuration.
   7. Type 1 to Save and Exit.
   8. Press End to send a Break to the ADCP.
   9. After the wake up message appears, check if the system has been configured properly.

```
>@C
WARNING:  Changing system configuration may affect performance!
          Know and understand the consequences before changing
          any settings.

System Configuration Menu

     0    Exit without Saving
     1    Save and Exit
     B    Beam Former Rev       A02 or later
     D    TCM/2 Detect          DISABLED
     O    Test Port             DISABLED
     P    Platform              SHIP
     S    Synchro Detect        ENABLED
     X    Transducer Type       ROUND 36x36
     ?    Display Menu
% 1

System Config saved to FLASH
```

If the system is configured properly and you still do not detect the TCM2 compass, use the Troubleshooting guide to determine the failure.

2.2.2 Interference Verification Test

This test checks receive-path characteristics, checks for interference signals in the processing circuitry, and checks gain values. A message similar to the following should appear.

> **NOTE.** Compare these test results with the dockside tests done when the system was first installed.

```
>PT3
Correlation Magnitude:
      Lag     Bm1       Bm2       Bm3       Bm4
       0      1.00      1.00      1.00      1.00
       1      0.77      0.77      0.78      0.77
       2      0.34      0.34      0.35      0.32
       3      0.05      0.11      0.05      0.04
       4      0.09      0.16      0.09      0.10
       5      0.08      0.13      0.08      0.06
       6      0.03      0.09      0.02      0.02
       7      0.02      0.09      0.02      0.03
RSSI: 13 13 11 14

PASSED

>
```

Interference Test Pass/Fail Conditions - The ADCP pings without transmitting and displays the result of an autocorrelation function performed over 8 lag periods. Ideally, we should see high correlation at near-zero lags, and then see decorrelation as the lags get longer. High correlation values at longer lags indicate interference is present.

> **NOTE.** PT3 Test is considered to have passed if the correlation values at lag 5 and greater are less than 0.50.

2.2.3 Bandwidth Verification Test

This test measures the receive bandwidth of the system.

> **NOTE.** Compare these test results with the dockside tests done when the system was first installed.

A message similar to the following should appear.

```
>PT6
Receive Bandwidth:
........................................
  Expected      Bm1    Bm2    Bm3    Bm4
  --------     -----  -----  -----  -----
   15500       14432  14498  15752  15406

PASSED

>
```

> **NOTE.** The PT6 Test is considered to have passed if the received bandwidth for each beam is within ± 20% of the expected bandwidth.

2.3 Dock Side Peripheral Tests

The Ocean Surveyor requires (at minimum) input for heading (true north) and for position fixes (GPS). Additionally, the Ocean Surveyor can make use of pitch and roll data to correct for the tilt.

Heading can be input directly to the Ocean Surveyor electronics chassis through an external synchro gyro or stepper gyro. Heading can also (or instead of) be input and combined with Ocean Surveyor data in the computer software *VmDas*. This heading input is done through the communications port of the computer with the NMEA 0183 string $HDT or $HDG or with PASHR or PRDID strings as specified in the **Transforms** tab in *VmDas*.

If the gyro connection is used for the heading input, then the Gyro Interface Board must be first configured to match the platform's gyro output. Follow the instructions in the Installation Guide on how to setup the Gyro Interface Board.

Pitch and Roll data can be input directly to the Ocean Surveyor electronics chassis through an external synchro gyro. Pitch and Roll can also (or instead of) be input and combined with Ocean Surveyor data in the computer software *VmDas*. This pitch/roll input is done through the communications port of the computer with the RDI proprietary NMEA PASHR or PRDID strings.

Navigation data can only be combined with Ocean Surveyor data in the computer software *VmDas*. This navigation input is done through the communications port of the computer with the NMEA proprietary strings $GGA and $VTG.

Table 2: Dock Side Peripheral Tests Setup

Setup	Description
Platform/Vessel	The Gyro, Navigation, and Pitch/Roll sensors should be attached to the appropriate place on either the Ocean Surveyor electronics chassis or the computer communication port. The devices should be on and should be stable (in the case of gyros this may require a spin up time of up to 12 hours).
Ocean Surveyor	The Ocean Surveyor electronics chassis should be connected to the transducer, AC Power connected to the electronics chassis, and the power switch turned on.
Computer	The RDI *BBTalk* program should be running, communications port setting (F5) to match the connection to the PC and Ocean Surveyor/Observer ADCP baud rate requirements (default 9600,N,8,1).

Testing the Gyro Connections to the Electronic Chassis

The following sequence of commands should be sent after powering up the Ocean Surveyor electronics chassis. These commands will wake up the

ADCP (<BREAK>), initialize the Ocean Surveyor (CR1), and save the initialization (CK).

```
<BREAK> press the end key
CR1
CK
```

The following command should be sent to test the gyro input to the Ocean Surveyor electronics chassis.

```
PC2
```

The response from the ADCP should be as follows:

```
>PC2
Heading          Pitch      Roll        Temperature
 (ext)           (ext)      (ext)       cts      degs
 000.0           +00.0      +00.0       243E     23.9
```

Testing the Navigation Connections to the Computer

Start *VmDas* in the Data Collect mode (see the *VmDas* User's Guide). On the **View** menu, select **Nmea Communications**. Confirm that the Navigation Device NMEA string is viewable and the $GGA string is present.

The **Navigation Data** window (see Figure 2) shows a text box of the position and velocity data from a NMEA navigation device. You can use this to verify the navigation connections.

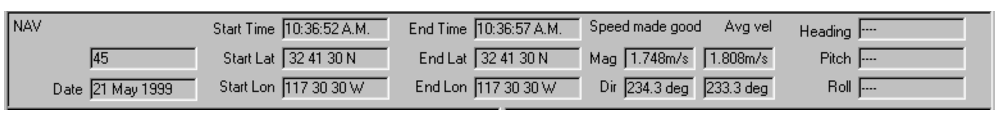

Figure 2. Testing the Navigation Connections

Testing $HDG or $HDT Heading Connections to the Computer

Start *VmDas* in the Data Collect mode. On the **View** menu, select **Nmea Communications**. Confirm that the Navigation Device NMEA string is viewable and the $HDG string is present. Note that the data for this information may appear on the same communications port as the navigation data or on a separate input port.

Testing $PASHR or $PRDID Heading Connections to the Computer

Start *VmDas* in the Data Collect mode. On the **View** menu, select **Nmea Communications**. Confirm that the Navigation Device NMEA string is viewable and the $PASHR or $PRDID string is present. Note that the data for this information may appear on the same communications port as the navigation data or on a separate input port.

Table 3: Dock Side Peripheral Test Results

Test	Test Criterion
External Gyro Connection Test	Verify that the Gyro inputs for Heading, Pitch and Roll (if included) are reasonable for the platform's attitude. The Temperature reading should match the expected water temperature at the transducer.
External Heading NMEA Connection Test	Verify that the Navigation Device NMEA string is viewable and the $GGA string is present.
External Heading NMEA Connection Test	Verify that the Navigation Device NMEA string is viewable and the $HDT or $HDG string is present.
External Heading NMEA Connection Test	Confirm that the Navigation Device NMEA string is viewable and the $PRDID string is present.

3 Sea Acceptance Tests

This procedure is intended to test the Ocean Surveyor/Observer at sea. This procedure assumes that the Dock Side Testing (see "Dock Side Tests," page 2) procedure has been run and that all of the items have passed or been confirmed to be operational. The following tests will not obtain favorable results unless all of this work has been performed.

The reason for Sea Acceptance Testing is that although the Dock Side Tests confirm the Ocean Surveyor/Observer is operational, they do not confirm that the system is able to perform to its specifications. The performance of any ADCP relies greatly upon the installation into any platform. Therefore, the system must be tested at sea to understand the effects of the platform on the ADCP performance.

At sea testing includes tests for Acoustic Interference, Profiling Range, and Profiling Reasonableness testing. For each of these tests the following Equipment and ADCP setup requirements are recommended.

Equipment Required

- Ocean Surveyor/Observer 38kHz, 75kHz, or 150kHz ADCP with firmware 23.xx or greater
- Computer
- *VmDas* Program
- *WinADCP* Program
- Navigation Interface Connected
- Heading Interface Connected

VmDas Setup

a. Start *VmDas*. On the **File** menu, click **Collect Data**. On the **Options** menu, click **Load**. Select the Default.ini file and click **Open**.

b. On the **Options** menu, click **Edit Data Options**. Click the **ADCP Setup** tab. Set the **Ensemble Time** to the value shown in Table 4.

Table 4: Ensemble Time

Frequency (kHz)	With Bottom Track (sec)	With Out Bottom Track (sec)
38	4	2
75	2	1
150	1	1

c. On the **ADCP Setup** tab, select **Use File**. Use Table 5 to choose a command file for your ADCP, and load it into *VmDas* using the **Browse** button.

Table 5: Command Files

File Name	**Description**
OS38**NB**DEF	Default setup for an OS 38kHz ADCP in the lowest precision (narrow bandwidth) but extended range profiling mode.
OS75**NB**DEF	Default setup for an OS 75kHz ADCP in the lowest precision (narrow bandwidth) but extended range profiling mode.
OS150**NB**DEF	Default setup for an OS 150kHz ADCP in the lowest precision (narrow bandwidth) but extended range profiling mode.

NOTE. These files can also be used for stationary systems (such as Oil Rig platforms) but you must first open the file (right click on file and select open) and modify the EZ command from EZ1020001 to EZ1111111 and change the BP command from BP1 to BP0. This new setting will enable the use of the internal heading, pitch, and roll sensors.

d. On the **Options** menu, click **Edit Data Options**. Click the **Averaging** tab. Set the **Short Term Average** to 300 seconds (5 minutes). Set the **Long Term Average** to 600 seconds (10 minutes).

3.1 Interference Test

The Ocean Surveyor/Observer transmits and receives acoustic signals from the water. If other sonar devices are operating on the platform at the same time as the ADCP it is possible for those signals to bias the ADCP data. Therefore, all ADCPs must be tested to ensure that they are not receiving interference from other sonar equipment on board the vessel.

The following Interference Test will determine if there is interference from other devices on board the vessel.

3.1.1 Interference Test Platform Test Setup

This test is performed best if the platform is in water deeper than the ADCP's maximum expected profiling range. Use the following table to determine the best water depth. If the water is shallower than 50% of the depths in Table 6, then do not run this test, as the results will be inconclusive.

Table 6: Interference Test Minimum Water Depth Requirement

OS 38 ADCP	OS 75 ADCP	OS 150 ADCP
1200 meters	1000 meters	600 meters

The platform speed for this test is stationary or drifting. The motors may be running if required for platform safety. The test sequence starts with ALL sonar and non-essential electronic equipment turned off. Only the ADCP should be on for the first test. This test establishes a base line for the interference and is critical to the rest of the tests. After a 10-minute period the first sonar device is turned on, transmission started, and the data is reviewed for interference terms. At the end of this 10-minute period the first sonar device is turned off and than the next sonar device is turned on and started pinging for 10 minutes. This process repeats for each of the sonar devices.

3.1.2 Interference Test Computer Screen Display Setup

View the RAW data (*.ENR files) being collected by the *VmDas* program in the *WinADCP* program contour plots for echo intensity data. This data will show the single ping return levels.

3.1.3 How to Identify Interference

If there is an interference term, the echo intensity data will show spurious echo intensity spikes. An example of what an interference term may look like what is shown in Figure 3, page 12.

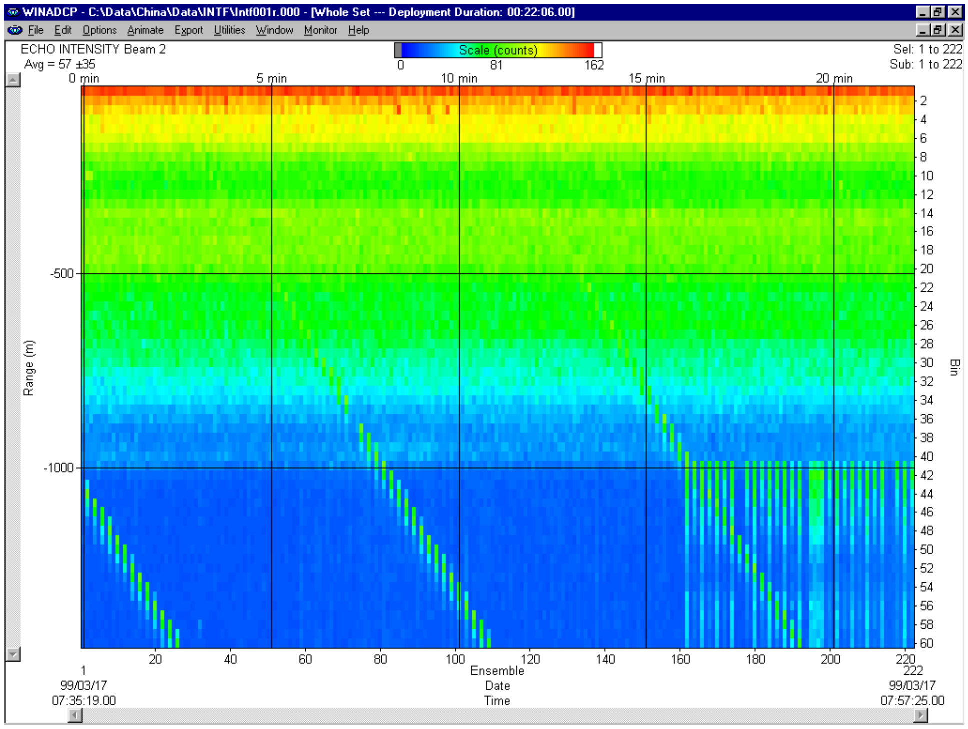

Figure 3. Interference Test

The interference term appears as the periodic green blocks in the data set. The interference is somewhat lost in the upper part of the profile however it can be clearly seen once the system reaches the noise floor (the point where signals are no longer being returned from the water).

> **NOTE.** Interference terms such as above seen anywhere in the echo intensity profile data will result in a bias to the ADCP data.

3.2 Water Profile Range Test

The range of any ADCP is directly dependent on the level of backscattering material in the water, the transmit power into the water, the received sensitivity, and the level of the background noise. Each of these effects the range of the system in different ways, but in the end can result in reduced or extended range as follows.

- The ADCPs transmit power and receive sensitivity are fixed based on the transducer frequency. However, these may be affected by installation of an acoustic window in front of the transducer. A window will absorb both sound transmitted by the ADCP and the sound returned from backscatter in the water.
- The volume of the backscatter in the water will affect the range. All specifications for range assume that there is a certain amount

of backscatter in the water. The backscatter volume is not controllable in any way.

- The background noise changes as the platform's speed increases or decreases. There are two types of noise created by the moving platform; first, there is the noise due to propeller and engines; and second, there is the noise created by the rushing water across the platform and ADCP transducer.

This test is used to determine the effects of the background noise on the range of the ADCP. This information can be used to determine the optimum speed of the platform to obtain the desired range required.

3.2.1 Water Profile Range Platform Test Setup

This test requires that the platform be in water deeper than the ADCP's maximum expected profiling range. Use the following table to determine the minimum water depth required.

Table 7: Water Profile Range Test Minimum Water Depth

OS 38 ADCP	OS 75 ADCP	OS 150 ADCP
1200 meters	1000 meters	600 meters

The platform course for this test is a continuous straight line. The speed of the platform will be varied during this test. At each speed, the system will be set to collect data for a minimum of 10 minutes. The following table lists the recommended speeds.

Table 8: Water Profile Range Test Platform Speed

Test #	Speed
Speed 1	Stationary or Drifting
Speed 2	3 knots
Speed 3	6 knots
Speed 4	9 knots
Speed 5	12 knots
Speed 6	Maximum Speed

NOTE. Speeds 2 through 6 are not applicable for Ocean Observers mounted on fixed platforms.

3.2.2 Water Profile Range Computer Screen Display Setup

View the Tabular Display of the Long Term Average data (10 minute averages) in the *VmDas* program.

3.2.3 How to Determine the Maximum Range of the ADCP

The data collected in the long-term average (10 minutes) tabular display will be used to determine the maximum range of the ADCP. The maximum profiling range of the system is determined by locating the last valid bin and then using that ping to determine the range. To determine the last valid bin the following criterion is used:

- The last bin must be above the bottom side lobe area
- The bin must have a percent good value above 25%
- The correlation value for at least 3 beams must be above the threshold of 120 counts

Locate the last valid bin for each of the speeds and fill in the table below.

Platform Speed	Last Valid Bin Number	Range to Last Bin	Average RSSI Value at Last Bin
Speed 1			
Speed 2			
Speed 3			
Speed 4			
Speed 5			
Speed 6			

Notes:

- Platform Speed must be input as a measurement from the Bottom Track (if in range) or the GPS speed.
- Range to Last Bin is found in the *VmDas* Tabular display or is calculated as follows: ((bin size) * (last bin number)) + (Blank + Depth of Transducer)
- Average RSSI Value at Last Bin is the average of the 4 beams RSSI values in the last bin number

The results from the above test should be compared to the specified nominal range of the system. Assuming that there are sufficient scatterers in the water, the acoustic window is not attenuating the signal, and that the platform background noise is variable there should be a speed at which the nominal range of the system is obtained.

3.3 Ringing Test

The ADCP transmits an acoustic pulse into the water. The main lobe of this pulse bounces off particles in the water and the signals returned from these particles are used to calculate the velocity of the water. The main lobe of the transmitted pulse is what we are using to process and calculate a velocity. The transmitted pulse, however, is made up of many side lobes off the main lobe. These side lobes will come in contact with metal of the transducer beam itself and other items in the water.

The energy from the side lobes will excite the metal of the transducer and anything bolted to the transducer. This causes the transducer and anything attached to it to resonate at the system's transmit frequency. We refer to this as "ringing." If the ADCP is in its receive mode while the transducer is ringing then it will receive both the return signals from the water and the "ringing." Both of these signals are then processed by the ADCP. The ringing causes bias to the velocity data.

All ADCPs "ring" for some amount of time. Therefore, each ADCP requires a blanking period (time of no data processing) to keep from processing the ringing energy. Each ADCP frequency has a different typical ringing duration. A blanking period (time of not processing data) is required at the beginning of each profile. The blanking distances required for the typical ringing period for each Ocean Surveyor/Observer frequency is shown in the following table.

Table 9: Required Blanking Distance

Frequency	Typical Blank Period for Ringing
38kHz	16 meters
75kHz	8 meters
150kHz	4 meters

Ringing will bias the velocity estimation to a lower value than it should be. However, when the platform motion is removed from the water profile data it will appear as a large velocity, which is the opposite of what it is really doing. This effect is caused because the vessel motion portion of the water profile data has been biased low.

3.3.1 Ringing Test Platform Test Setup

The key to success on this test is that the water velocity and direction not change over the entire test period of 120 minutes. This may be difficult to adhere to in regions with large tidal effects. The test requires that the platform be within the ADCP bottom tracking range so that valid bottom track can be used. Use the following table to determine the optimum water depth range required.

Table 10: Ringing Test Water Depth Requirement

OS 38 ADCP	OS 75 ADCP	Ocean Surveyor/Observer 150 ADCP
300-600 meters	200-400 meters	100-200 meters

Platform speed should be held to as fast a speed as possible without loosing any bottom tracking data for a period of 30 minutes. Typically, this will be a speed of 6-9 knots. Some experimentation may be required to find the maximum bottom track speed for the given depths above.

3.3.2 Ringing Test Computer Screen Display Setup

The Magnitude and Direction Profile Display of the Long Term Average data (10 minute averages) will be viewed in the *VmDas* program.

3.3.3 How to Determine the Ringing Test Results

Viewing the Long Term average of the magnitude and direction profile data, look for unreasonable shears from bin 1 to bin 2 to bin 3 and so on. If an unreasonable shear is seen, this is most likely ringing and your blanking needs to be increased by the following formula:

(bin size) * (last bin number with ringing) * 0.80

*The total blanking period is typical blanking period plus the increased blanking period required. The above value should be used to change both the NF and WF commands in all configuration files for this ADCP.

3.4 Transducer Alignment Test

The mounting alignment of the transducer to the relative position of the heading input from the vessel is critical in the velocity estimates made by the ADCP. If either of these are not known and corrected for, it will result in both directional and velocity estimate errors water the velocity data.

It is possible to confirm if the transducer alignment is correct by collecting data over the same water in several different directions. If the transducer is aligned then the both the magnitude and direction of the currents will appear the same in all directions that the platform travels.

3.4.1 Platform Testing Setup

The key to success on this test is that minimal water velocity and direction change over the entire test period. The following test will take a minimum of five hours to collect. This length of time is required in order to obtain enough data samples to reduce the noise sufficiently. This test requires that the platform be within the ADCP bottom tracking range, so that valid bottom track can be used, and that reliable GPS data be available (DGPS is recommended). Use the following table to determine the optimum water depth range required.

Table 11: Transducer Alignment Test Water Depth Requirement

OS 38 ADCP	OS 75 ADCP	OS 150 ADCP	OS Mariner 300 ADCP
300-600 meters	200-400 meters	100-250 meters	80-160 meters

The platform speed is to be held at a constant speed. Any speed between 5 to 10 knots is acceptable, however once a speed is selected then the vessel should maintain that speed during the entire course. The course for this test contains a minimum of five legs. Each leg must be a minimum of 30 minutes long (1 to 2 hours per leg is the optimal time). The course of ship travel is shown in the below figure. All data must be collected in beam coordinates

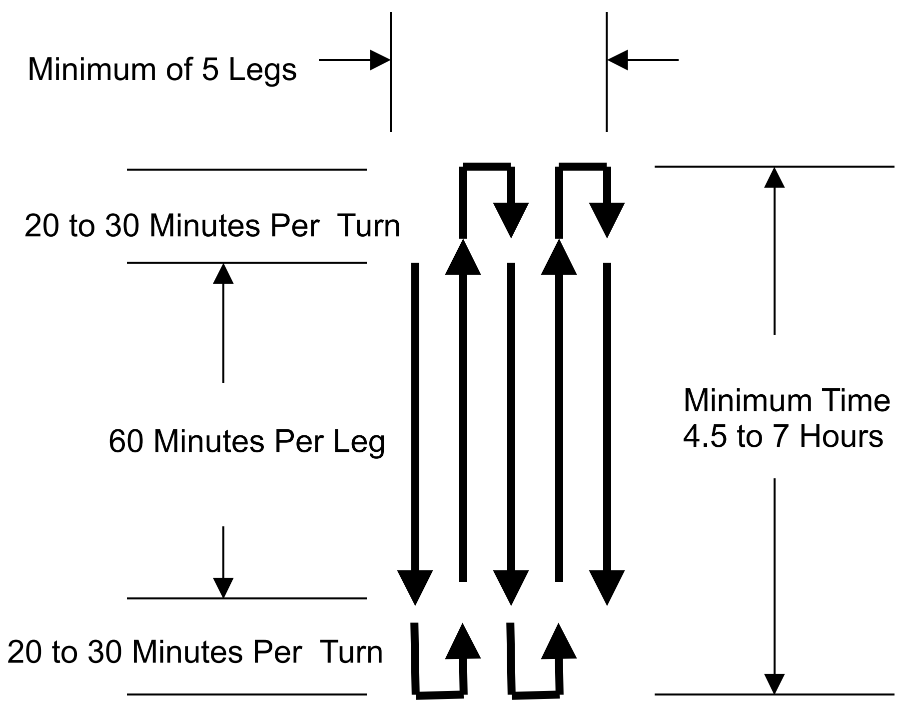

Figure 4. Transducer Alignment Test

3.4.2 Computer Screen Display Setup

View the *VmDas* ship track display of bin 3 with the bottom track reference. The Long Term Average (5 minute averages) data should be viewed.

Each of the vertical lines represents the point when the vessel changed directions.

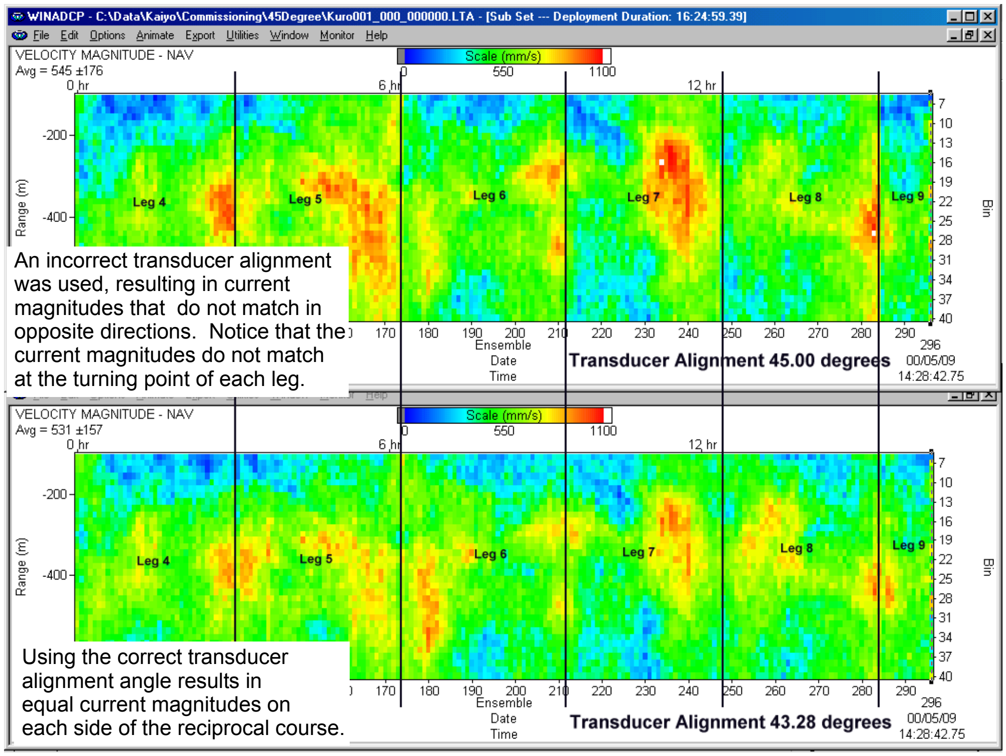

Figure 5. Transducer Alignment Display

3.4.3 Transducer Alignment Results Sheet

A pass condition is if the velocities in each of the ship track plotted directions has the reasonably the same magnitude and direction. It is common to see some wild velocity magnitude and directions. This happens as a result of the effects of the turn on the gyro heading device or the latency of the heading updates for a GPS heading input.

If the direction of the currents is not the same in each of the directions then it will be necessary to enter in a transducer misalignment angle. The 5-minute averages of both GPS and Bottom Track Direction are compared in at least 2 of the legs traveled. An average direction along each leg is calculated for both the GPS and Bottom Track data. The difference in the average directions is the misalignment angle.

Record the results of this portion of the Transducer Alignment with Bottom Track Reference with the formula:

Misalignment Angle = (GPS Average Direction) – (Bottom Track Average Direction)

Misalignment Angle Required	Degrees

Changing the transducer alignment angle, reprocessing the data, and finally playing back the same data file again allows you to confirm if the mis-alignment angle correction is correct. A pass condition is if the velocities in each of the ship track plotted directions has the reasonably the same magnitude and direction. It is common to see some wild velocity magnitude and directions.

Record the results of the verification of the Transducer Alignment with Bottom Track Reference:

Alignment Verification	Pass/Fail

Change the data display reference from bottom track to the navigation data in the VMDAS program. A pass condition exists if little to no change in the velocity magnitude and direction occurred when switching to the navigation data reference

Record the results of this portion of the Transducer Alignment with Navigation Reference:

Navigation Verification	Pass/Fail

3.5 Bottom Tracking Test

The bottom tracking capability of the ADCP varies depending on the type of bottom (hard, soft, rock, sand, etc.), the slope of the bottom, and the speed of the vessel (background noise).

Before testing the Bottom Track capabilities, the Water Profiling Range Test must be performed (see "Water Profile Range Test," page 12). Use the speed that allowed the nominal water profile range to be obtained or the maximum range if the nominal range was not obtained.

3.5.1 Bottom Tracking Platform Test Setup

The key to this test is to operate the system in an area where both the minimum and maximum bottom tracking range can be obtained. The platform will travel over water that is very shallow (<10 meters) to very deep (greater than the maximum bottom track range). It does not matter if the water starts deep and goes shallow or vice-versa.

The course of the platform should be a relatively straight line. The platform speed should be no greater than the velocity recorded in the Water Profiling Range Test.

3.5.2 Bottom Tracking Computer Screen Display Setup

View the raw data display of the *VmDas* bottom track display window.

3.5.3 How to Determine Bottom Tracking Reasonableness

Viewing the bottom track velocity data, record the maximum and minimum average of the bottom track depths in the table below.

Beam Number	Minimum Depth (meters)	Maximum Depth (meters)
Beam 1		
Beam 2		
Beam 3		
Beam 4		

A pass condition is if the maximum depth of the system is equal to the specification for the nominal bottom track range.

> **NOTE.** If the system was not able to water profile to the nominal range, then the bottom track range should be reduced to no more than the same percentage as the water profile loss.
>
> If the Bottom Track **did** obtain the complete range and the Water Profile **did not**, then it is likely that there is insufficient backscatter in the water to obtain the specified range.

4 How to Contact RD Instruments

If you have technical problems with your instrument, contact our field service group in any of the following ways:

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The industry leader in Customer Support has just raised the bar another notch. RD Instruments introduces the After-Hours Emergency Service. When the RDI-US and RDI-Europe office is closed, customers may now call +1 858-578-0781 to have their after-hours emergencies resolved.